

ArcGIS Desktop Tips and Tricks II

UGIC 2008
Cedar City, UT

Will start at 8:30
Jeremiah Lindemann

Outline

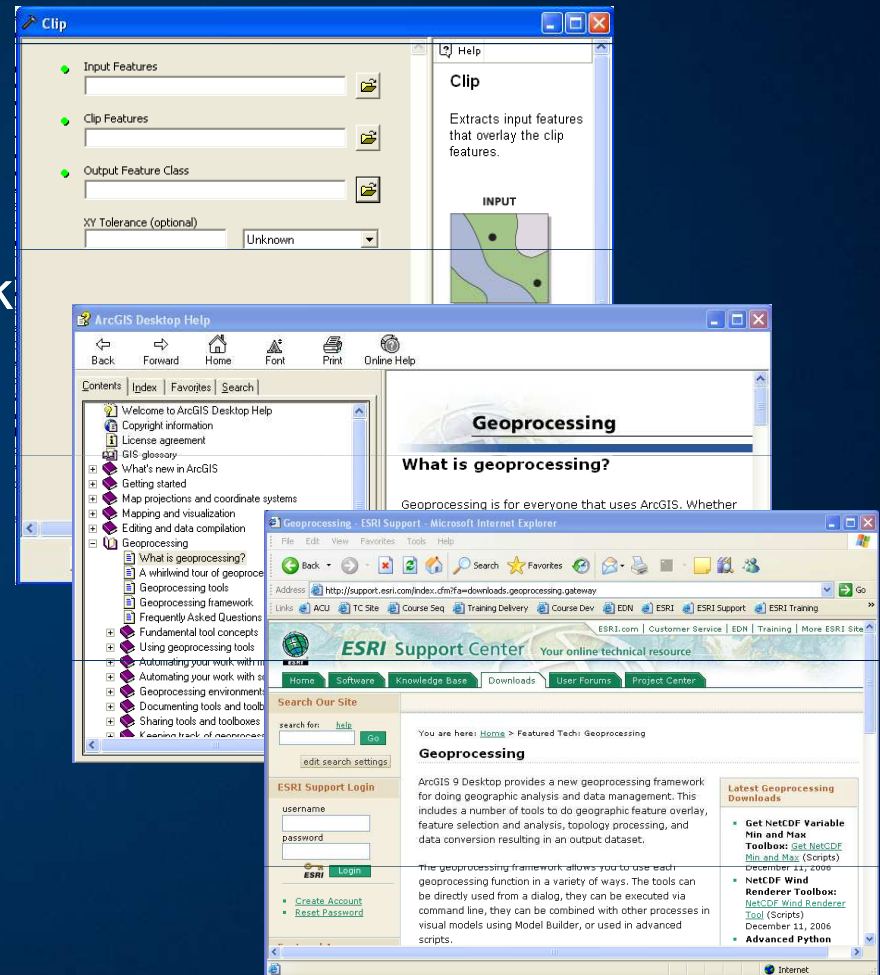
- Section 1
 - Geoprocessing
 - Geoprocessing Settings
 - Model Builder hints and tricks
- Section 2
 - Customizing ArcGIS Desktop
 - Customizing the UI
 - Introduction to VBA
- Q & A

Section Outline

- Geoprocessing Documentation
- Environments and Settings
 - Levels of Environments, Saving GP settings
- Managing Toolboxes
 - Where are toolboxes stored?
- History and Results
 - History toolbox, New Results tab
- Tools
 - Processing large datasets, Some useful tools, Batch processing
- Model Builder
 - Iterations, Variables, Lists, Series, Layer symbology, On-the-fly inputs

GP Documentation

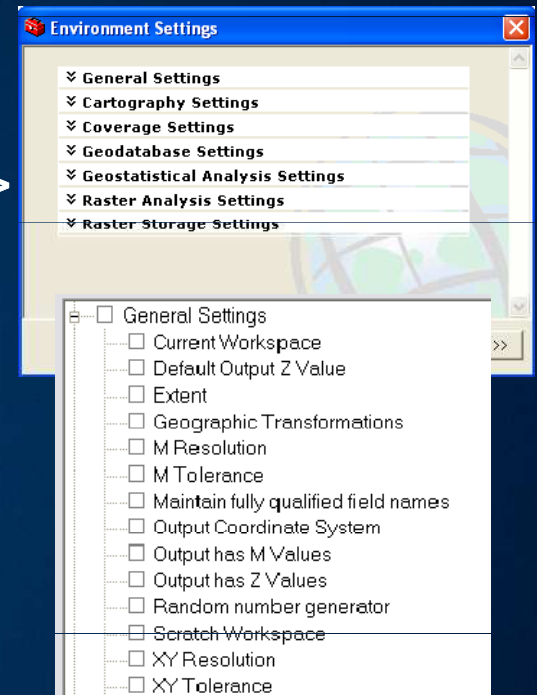
- Tools – Built in “quick help”
- ArcGIS Desktop Help system
 - Geoprocessing book
 - Geoprocessing Tool Reference book
- Documentation
 - What’s New in ArcGIS 9.2
 - ESRI Support > Geoprocessing



Environments

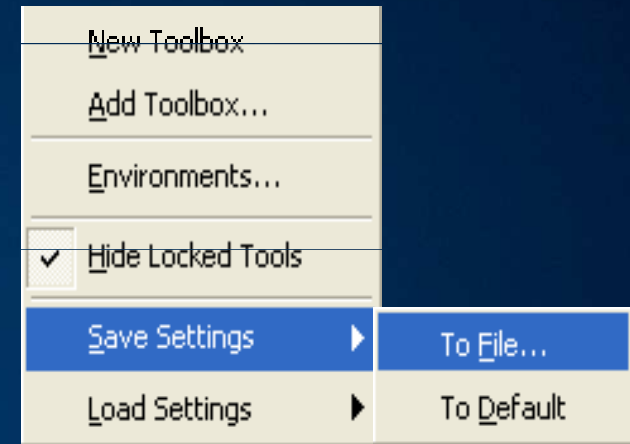
Four levels:

- Application – all tools
 - Tools > Options > Geoprocessing tab > Environments
- Tool – Environments button
- Model – all processes
 - Model Menu > Model Properties > Environments
- Model Process
 - Environments on tool dialog



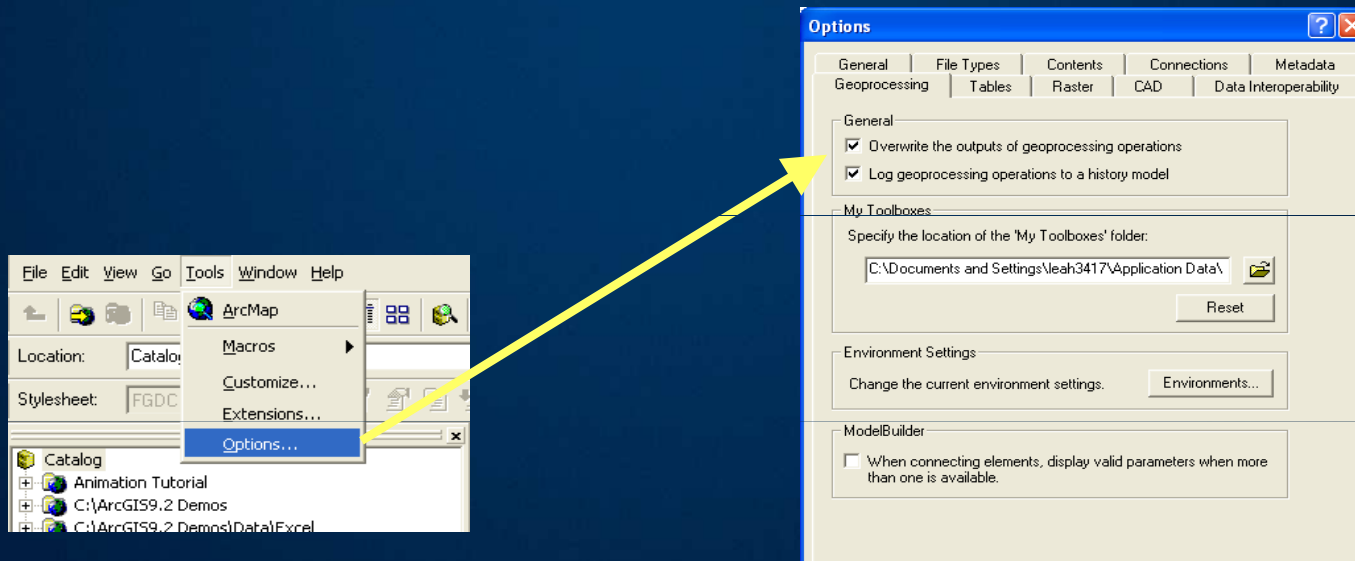
Saving GP Settings

- Settings include
 - List of toolboxes
 - Environments
 - Contents of Results tab
 - Command Line variables
- Save settings to a file (XML), or to default manually
- C:\Documents and Settings\<your profile>
Application Data\ESRI\ArcToolbox\ArcToolbox.dat



Geoprocessing Settings

- Geoprocessing Settings:
 - Overwrite outputs – automatically overwrite existing data
 - Where to create new toolboxes (change My Toolboxes location)
 - Automatically add tool output to display
 - Contents of ArcToolbox
 - History logging

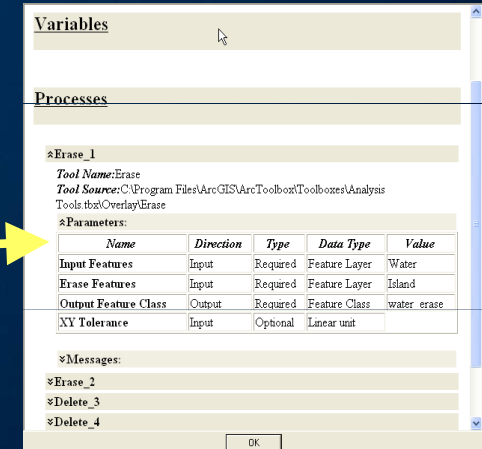
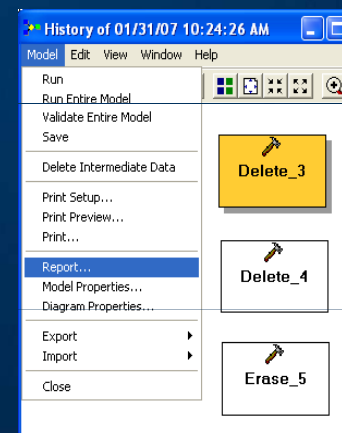
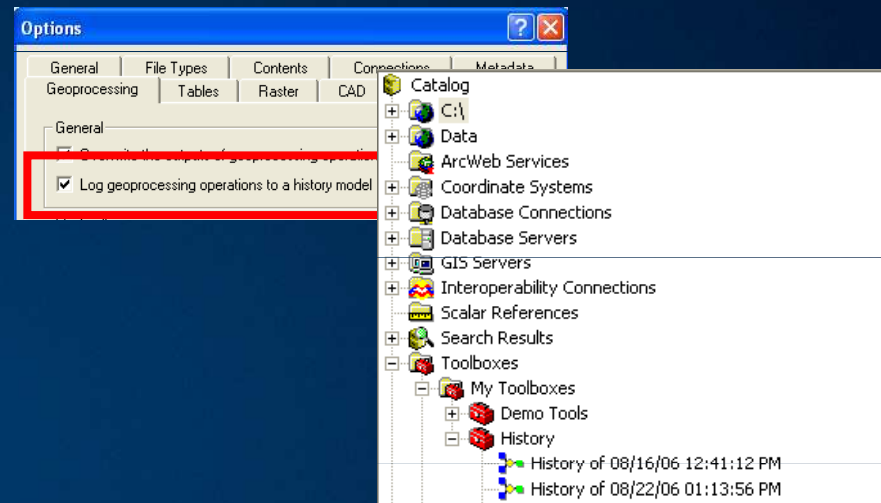


Managing Toolboxes

- Where are custom toolboxes stored?
 - Folders
 - Geodatabases
 - My Toolboxes folder
- Common Question...
 - I created a New Toolbox in ArcToolbox, where is it stored?
 - C:\Documents and Settings\<your profile> \Application Data\ESRI\ArcToolbox\MyToolboxes
- Toolboxes can be saved to earlier versions (9.0/9.1)
 - Right-click the toolbox > Save As 9.0/9.1

History Toolbox

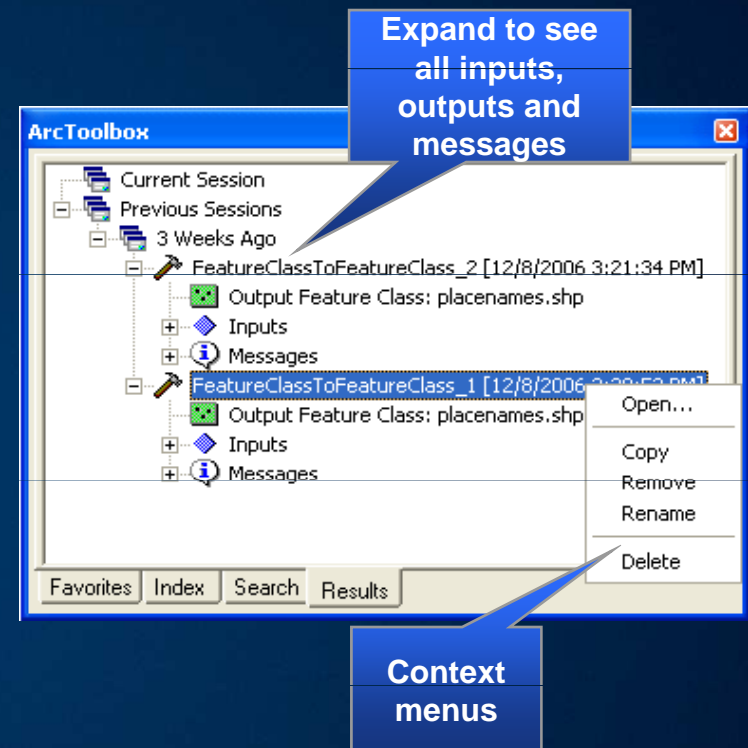
- Models of previous run geoprocessing sessions
- Toolbox automatically created in My Toolboxes
- Model Reports can be created – documents everything contained in the model



Results Tab

New at 9.2

- A record of every tool you run
- Includes inputs, outputs, and messages
- Right-click opens a menu of useful items
 - Delete all outputs of a tool
 - Open the tool dialog and re-execute
 - Remove the entry
 - Drag and drop data
 - Copy data (text)
- Results are per application session



Processing Large Datasets

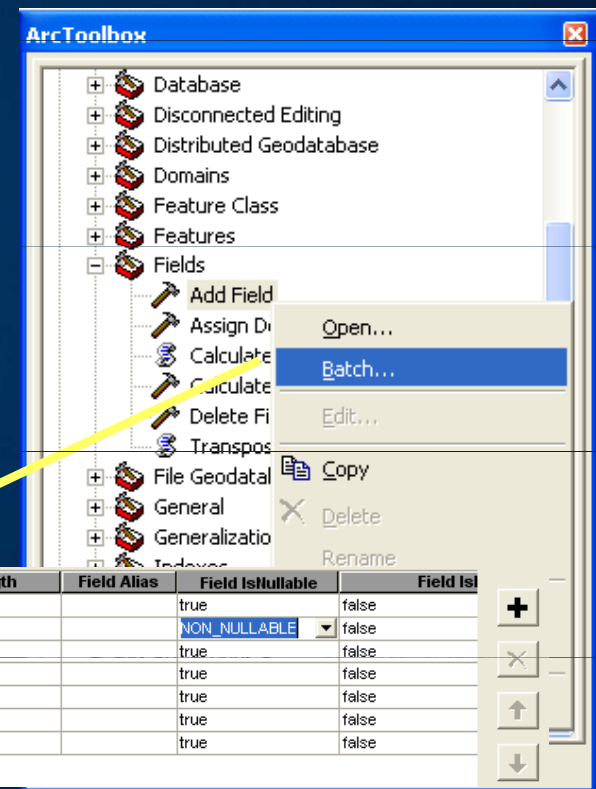
- Large inputs are tiled, processed and then reassembled
 - Messages indicate when tiling occurs
- Tools will work with the amount of memory on the machine
- Outputs should be written to file or enterprise geodatabases due to size limitations



Batch Processing

New at 9.2

- Any tool may be opened in a batch mode
- Right-click a tool and click Batch – opens the Batch grid
- Use *Fill* and *Browse* to quickly fill the batch grid

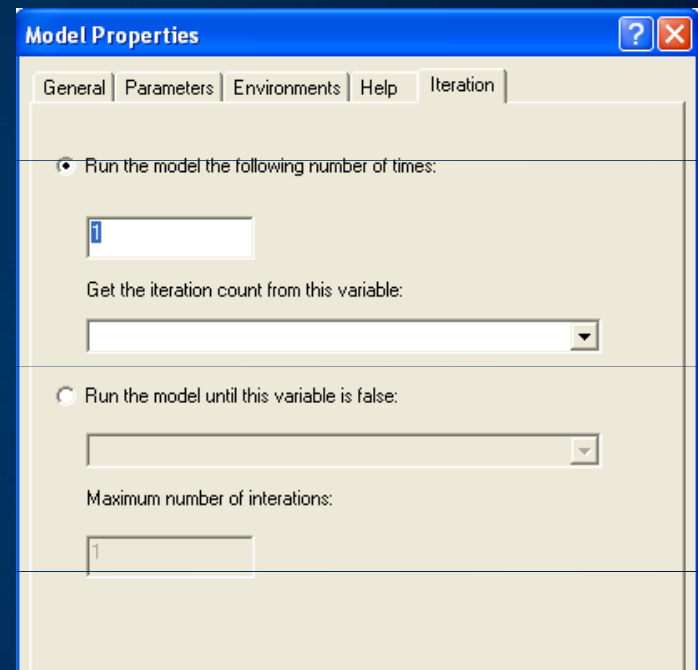


	Input Table	Field Name	Field Type	Field Precision	Field Scale	Field Length	Field Alias	Field IsNullable	Field Is
1	C:\junk\Atlanta.gdb\Places	Street	TEXT			30		true	false
2	C:\junk\Atlanta.gdb\Places	CommonName	TEXT			20		NON_NULLABLE	false
3	C:\junk\Atlanta.gdb\Places	City	TEXT			15		true	false
4	C:\junk\Atlanta.gdb\Places	ZipCode	TEXT			10		true	false
5	C:\junk\Atlanta.gdb\Places	County	TEXT			20		true	false
6			LONG					true	false
7			LONG					true	false

Model Builder: Iterations

New at 9.2

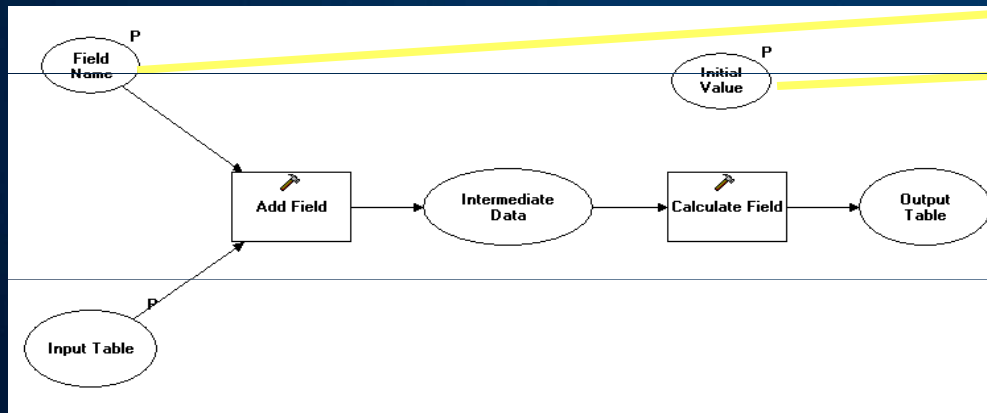
- Iteration controls number of times a model runs
 - Fixed number of times
 - Variable value
 - Boolean condition
- Set from Model Properties



Model Builder: Variables

New at 9.2

- Setting variables for multiple outputs
 - Output from an iteration
 - In-line variables and substitution
 - %i% = current position in a list variable
 - %n% = current model iteration
 - Initial value is zero



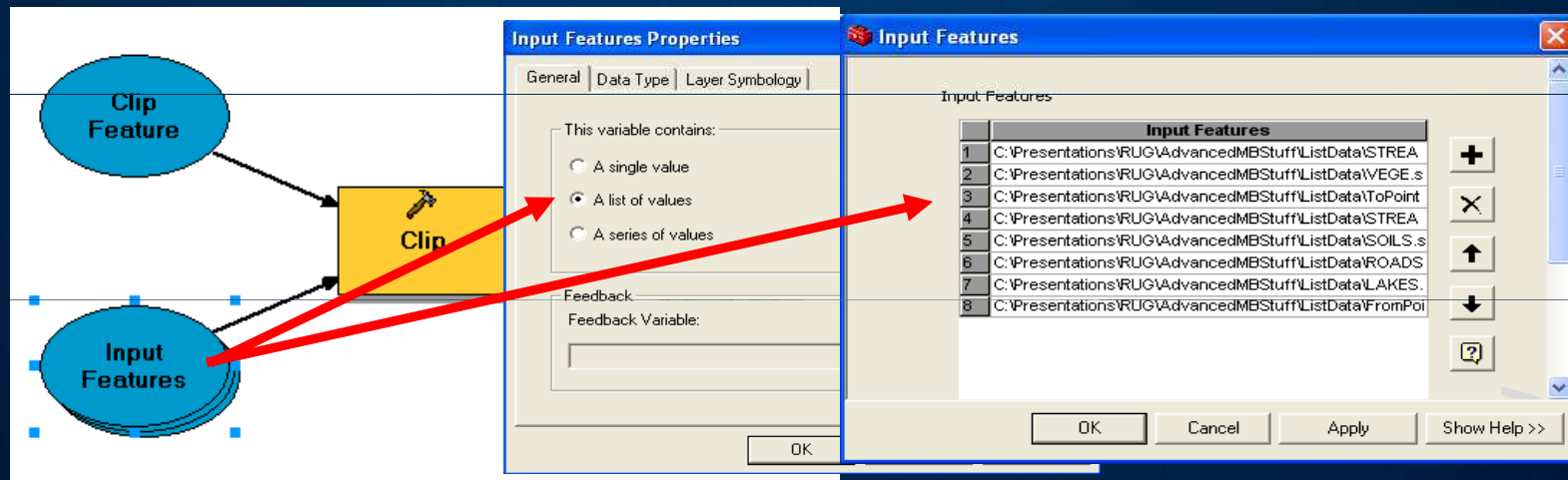
The screenshot shows the 'Calculate Field' dialog box with the following fields:

- Input Table:** Intermediate Data
- Field Name:** %Field Name%
- Expression:** %Initial Value%
- Expression Type (optional):** VB
- Code Block (optional):** (Empty text area)

Yellow arrows from the flowchart point to the 'Field Name' and 'Initial Value' fields in this dialog box.

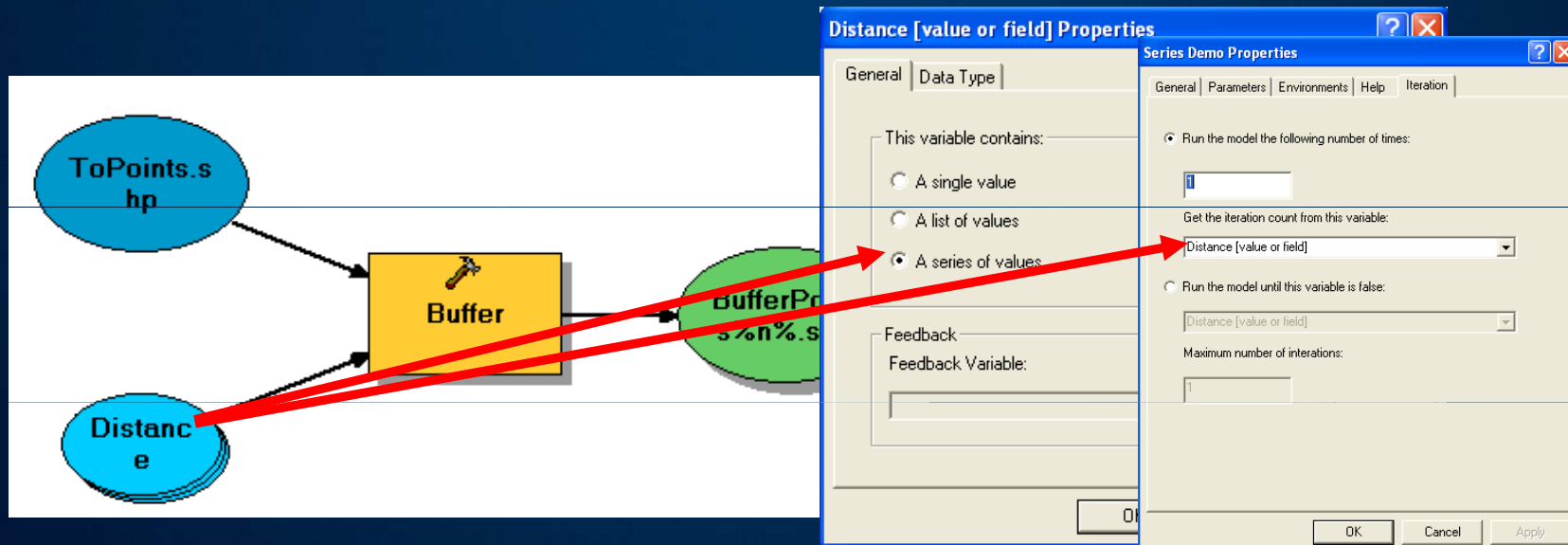
Model Builder: Lists

- *New at 9.2*
- Lists are INDEPENDENT of Model Iteration
 - A process is executed for each value in a list
 - The number of outputs is equal to the maximum number of inputs
 - If input lists are not the same length, the last value is reused in the shorter list
 - The keyword **%i%** indicates the current list index



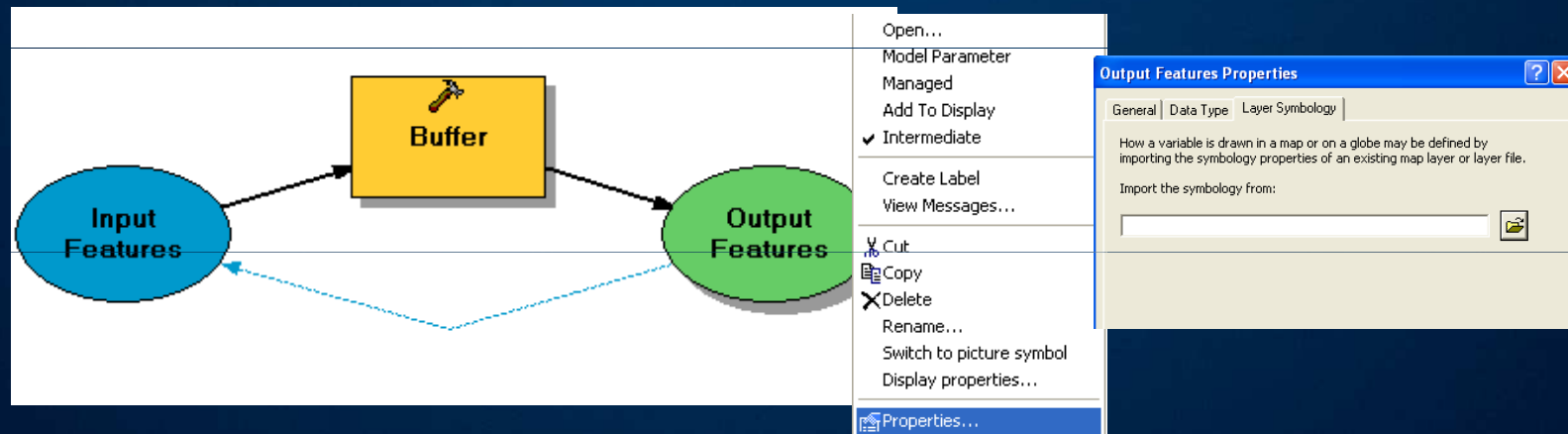
Model Builder: Series

- *New at 9.2*
- Series are DEPENDENT on Model Iteration
 - Model iteration executes the entire model each time
 - The model iteration determines which value from a series was used
 - The keyword **%n%** indicates the current iteration number



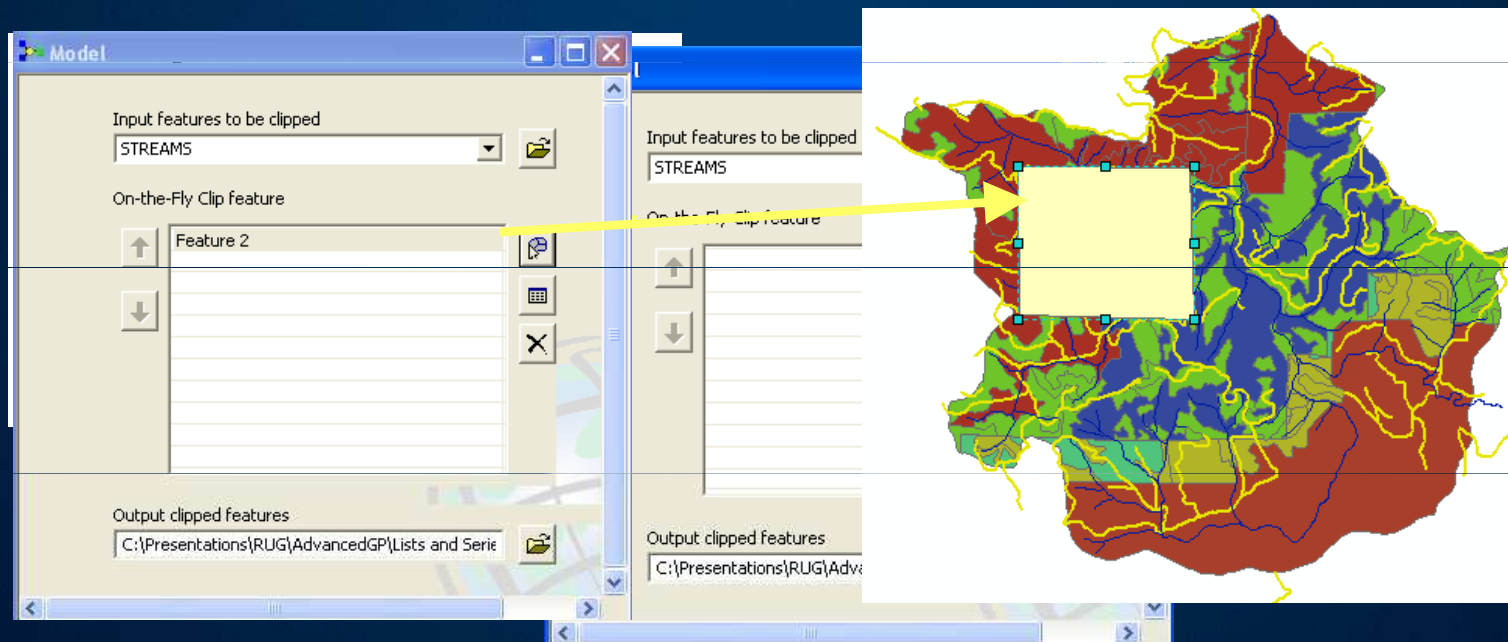
Model Builder: Layer Symbology

- *New at 9.2*
- Specify output layer symbology from existing layer in TOC or layer file (.lyr)
- The layer symbology is imported into the model and the layer or layer file are no longer referenced
- Great for re-running a model and comparing results (e.g. Weighted Overlay tool)



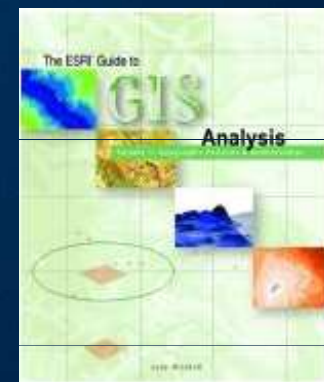
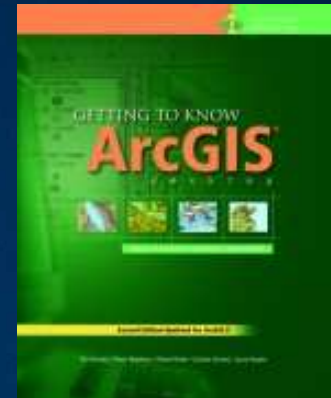
Model Builder: On-the-fly Inputs

- *New at 9.2*
- Must be used in ArcMap
- Draw features on-the-fly as inputs to the model
- Uses “feature sets” as the input Data Type
- Schema and symbology imported



Additional Reading

- *Getting to Know ArcGIS Desktop, Second Edition*
 - Basics of ArcView, ArcEditor, and ArcInfo, Now includes ArcGIS 9.2 trial software on DVD
- *The ESRI Guide to GIS Analysis, Volume 1*
 - Focuses on studying Geographic patterns and relationships



Training Resources

Instructor-Led Training

- *Advanced Analysis with ArcGIS*
 - What is spatial analysis? Geoprocessing, ModelBuilder, Spatial Statistics
- *Introduction to Geoprocessing Scripts Using Python*
 - Geoprocessing framework, basics of Python, tools and environment settings, Geoprocessor object, describe objects, cursor objects, scripts in the Geoprocessing framework
- *Writing Advanced Geoprocessing Scripts Using Python*
 - Manipulate strings, lists and dictionaries, read and write text files, create reusable code, read and write geometries, incorporate Python scripts into models

Outline

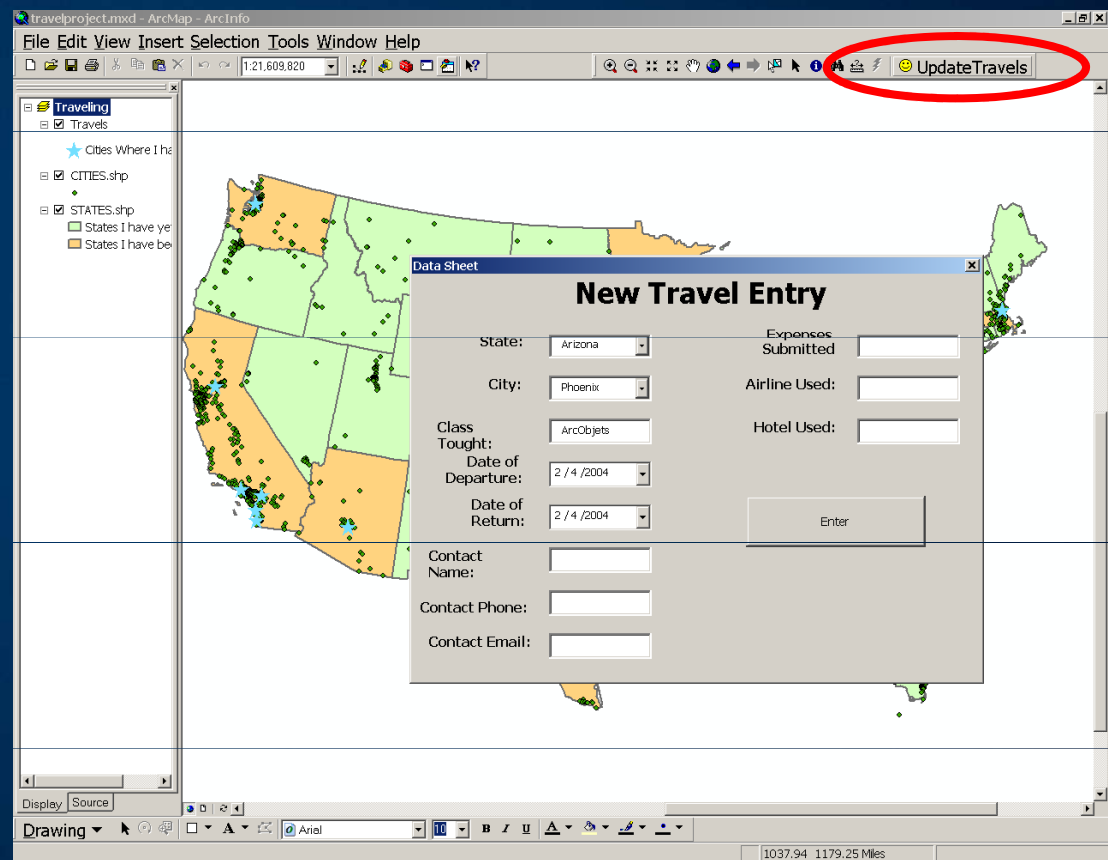
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Section Outline

- The VBA environment
 - Customize Dialog Box
 - Visual Basic Editor
- Creating UIControls
- Brief intro to ArcObjects
 - Common ArcObjects
 - Where to start
 - Interfaces
- Q & A

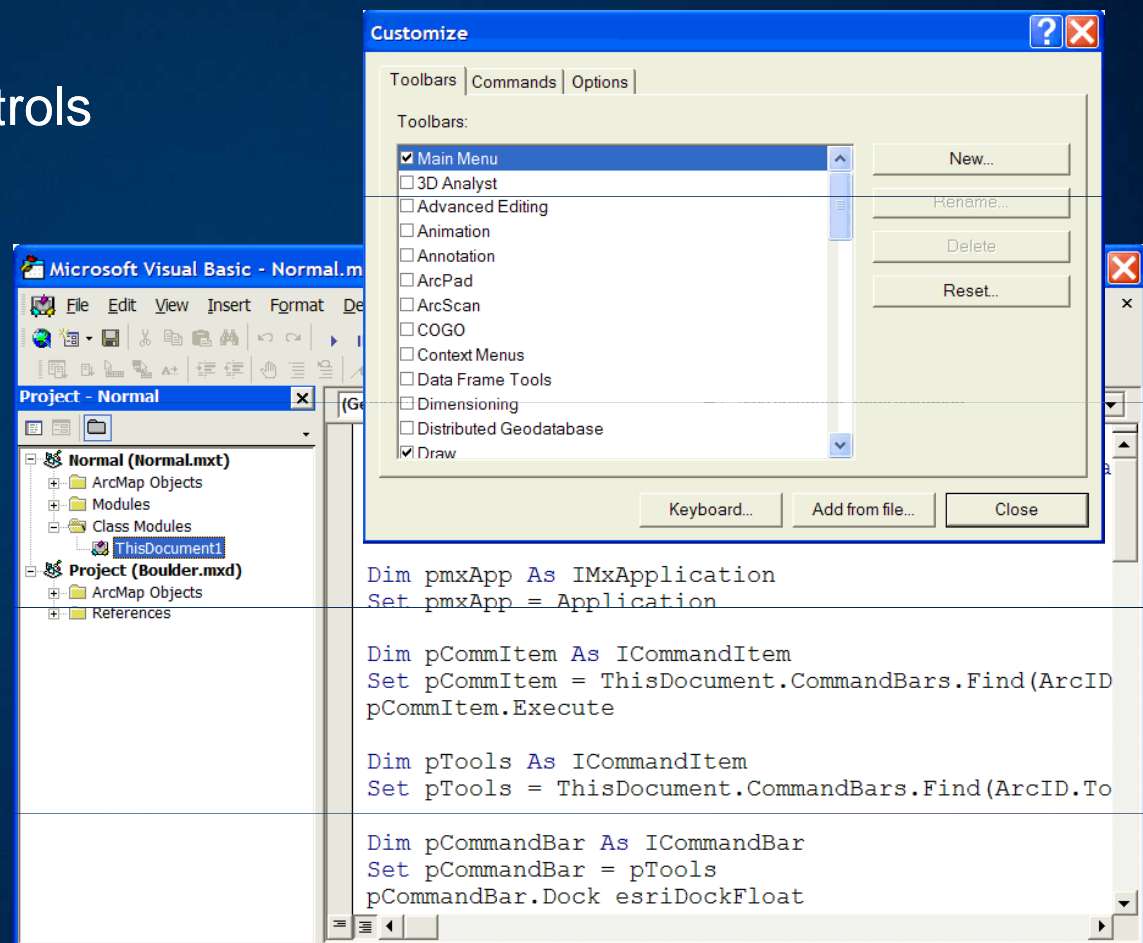
VBA Customization

- Use VBA to extend ArcMap/ArcCatalog
- Create custom user forms, buttons and tools
- Automate workflows
- *Subject of this seminar*



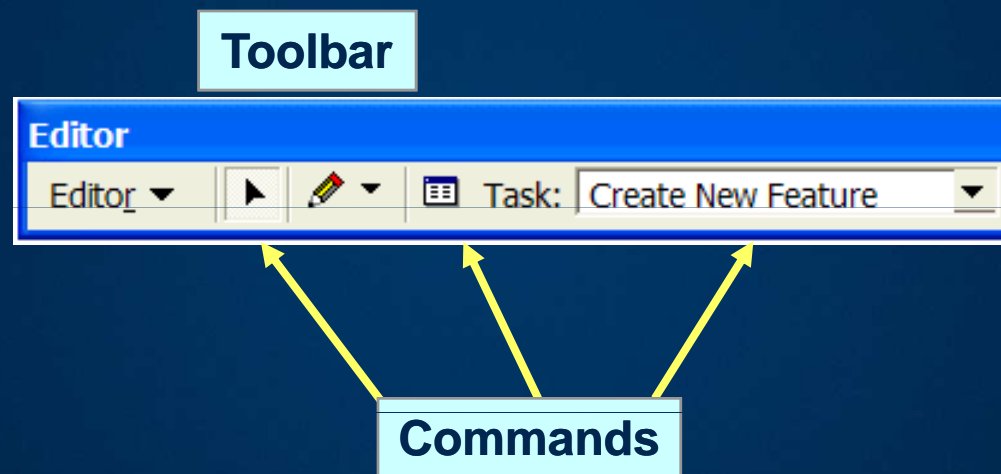
VBA development environment

- Customize dialog box
 - Customize ArcGIS interface without code
 - Create new toolbars
 - Add and remove controls
- VBA Editor
 - Code UIControls
 - Create forms
 - Write macros



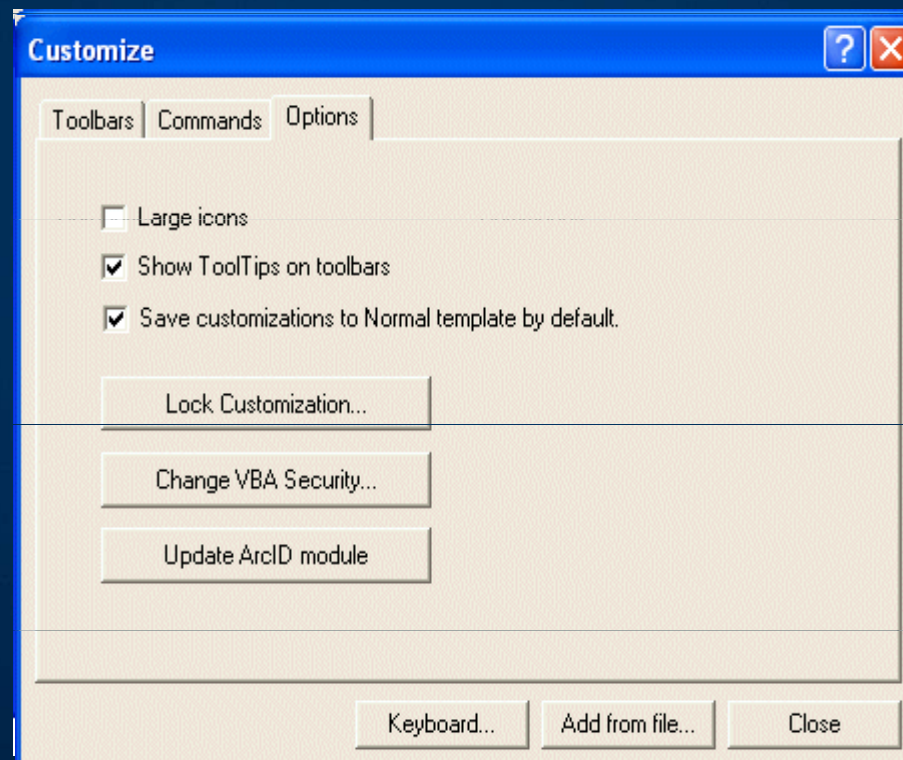
ArcGIS commands

- Toolbars and menus contain commands
- Commands are buttons, menus, macros, and UIControls
- Each command has associated code



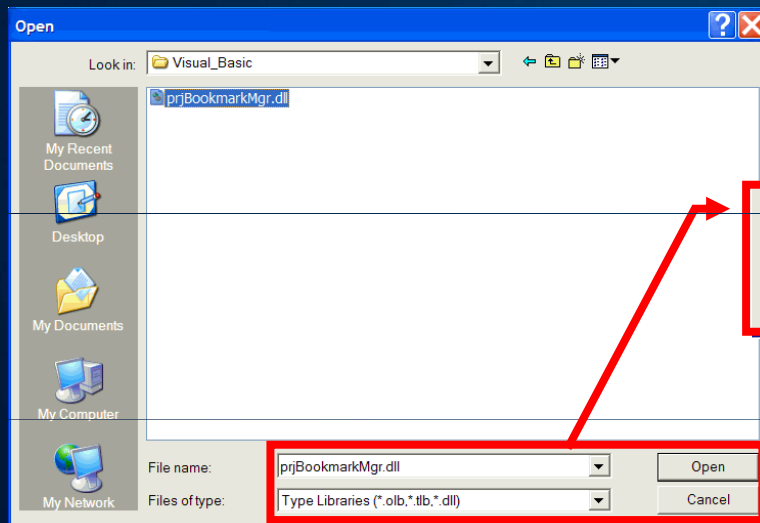
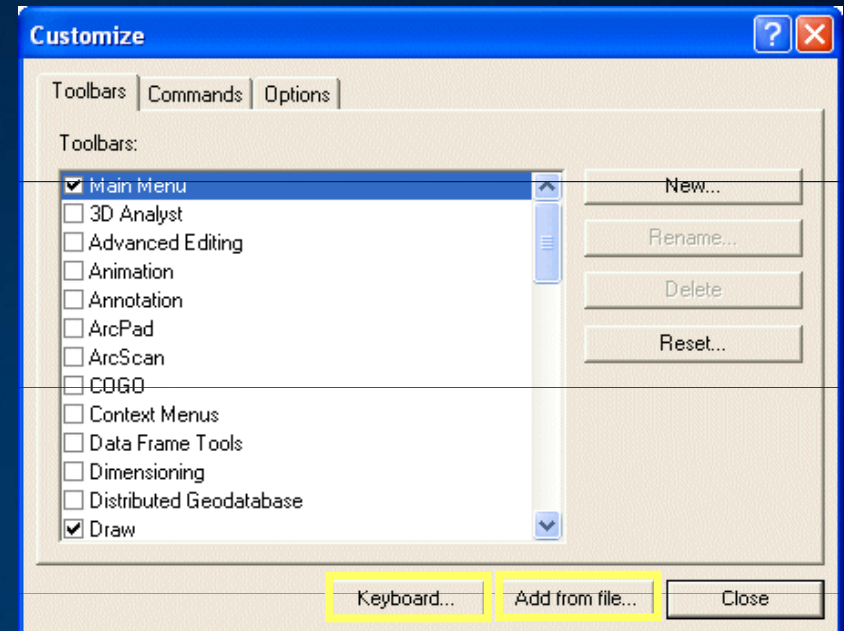
Customize dialog box

- Turn toolbars on/off and create new toolbars
- Add commands to toolbars or menus
- Password protect customizations



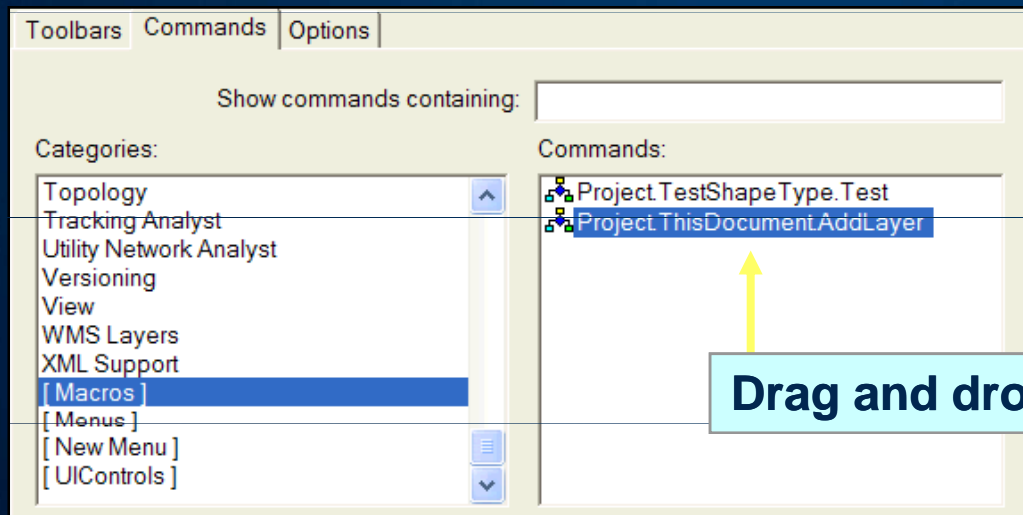
Customize dialog box: additional options

- Available on all tabs
- Keyboard
 - Assign shortcut keys
- Add from file
 - Add custom command to ArcMap



Creating macros

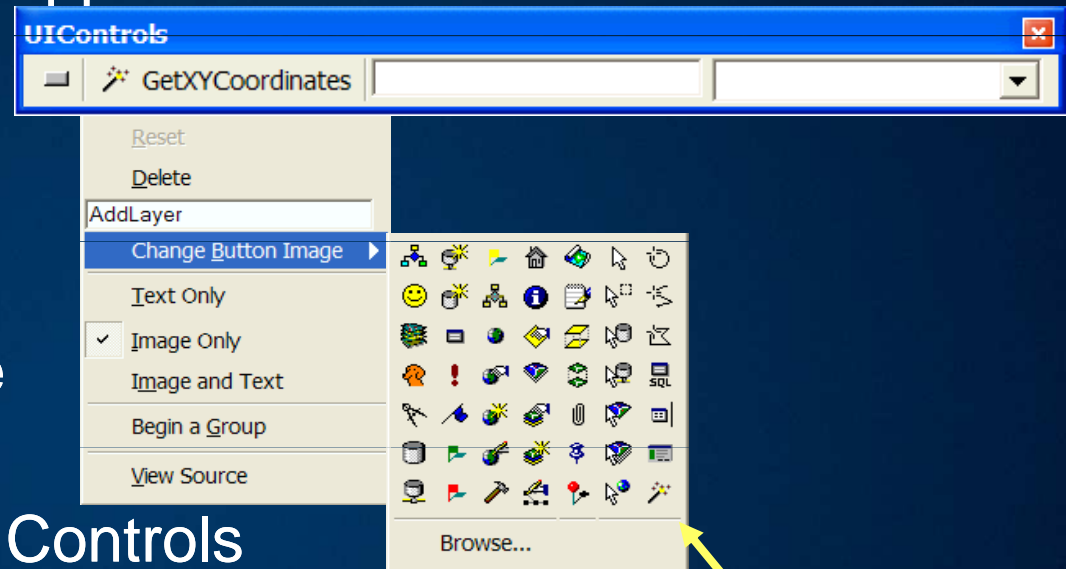
- Code written ahead of time
 - Public level Sub procedure with no arguments
- No associated button or tool
 - Must run from VBA or ArcMap menu
- Scope determines accessibility
- Add to ArcGIS interface



Drag and drop onto menu or toolbar

Setting UIControl properties

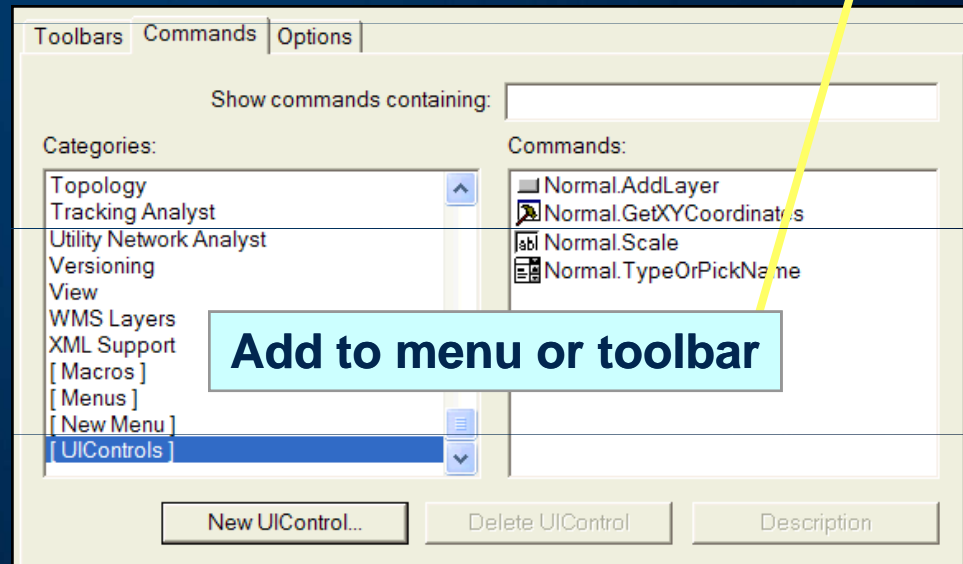
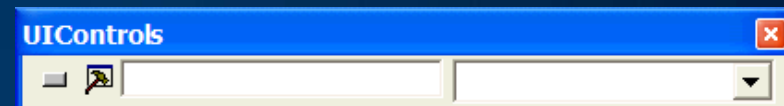
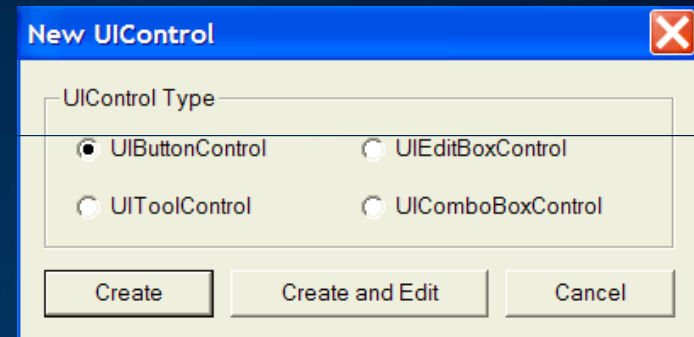
- Set properties that define appearance of UIControls
 - Name
 - Image (16x16 bitmap)
 - Display text, image, or both
 - Begin a group
- View source to write code
 - Opens Visual Basic Editor
- Can only view code for UIControls
 - VBA code samples available
- Customize dialog box must be open



**Choose icon or
browse to your own**

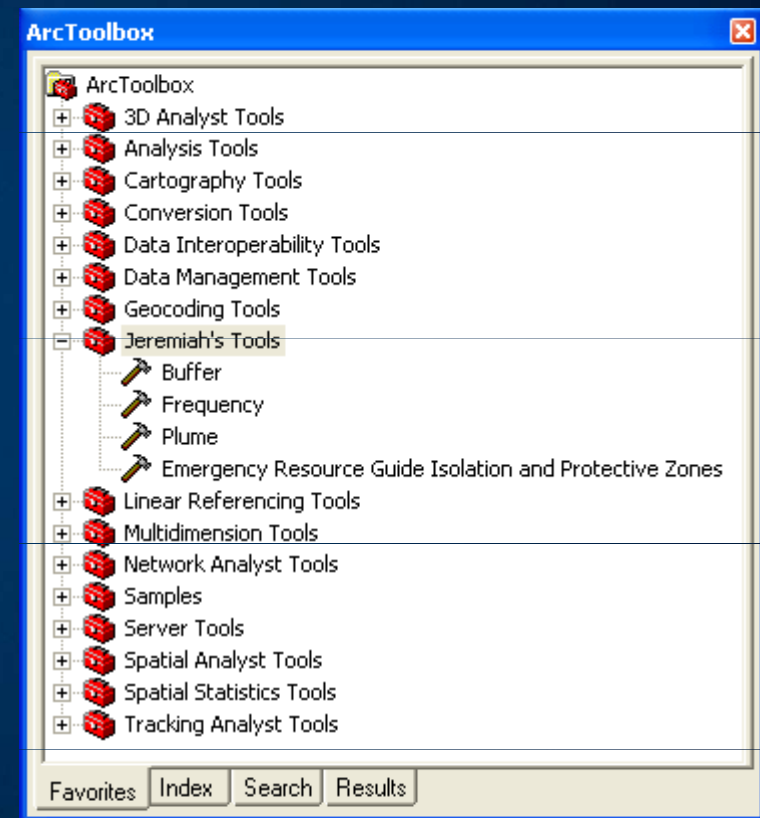
Creating UIControls

- User-interface controls
- UIControls category
- Four types
 - Button
 - Tool
 - Edit box
 - Combo box
- Controls have events
 - UIButton: Click
 - UITool: MouseDown



Customizing ArcToolbox

- Can add and remove toolboxes
- Add tools to custom toolboxes
- Save settings to a file

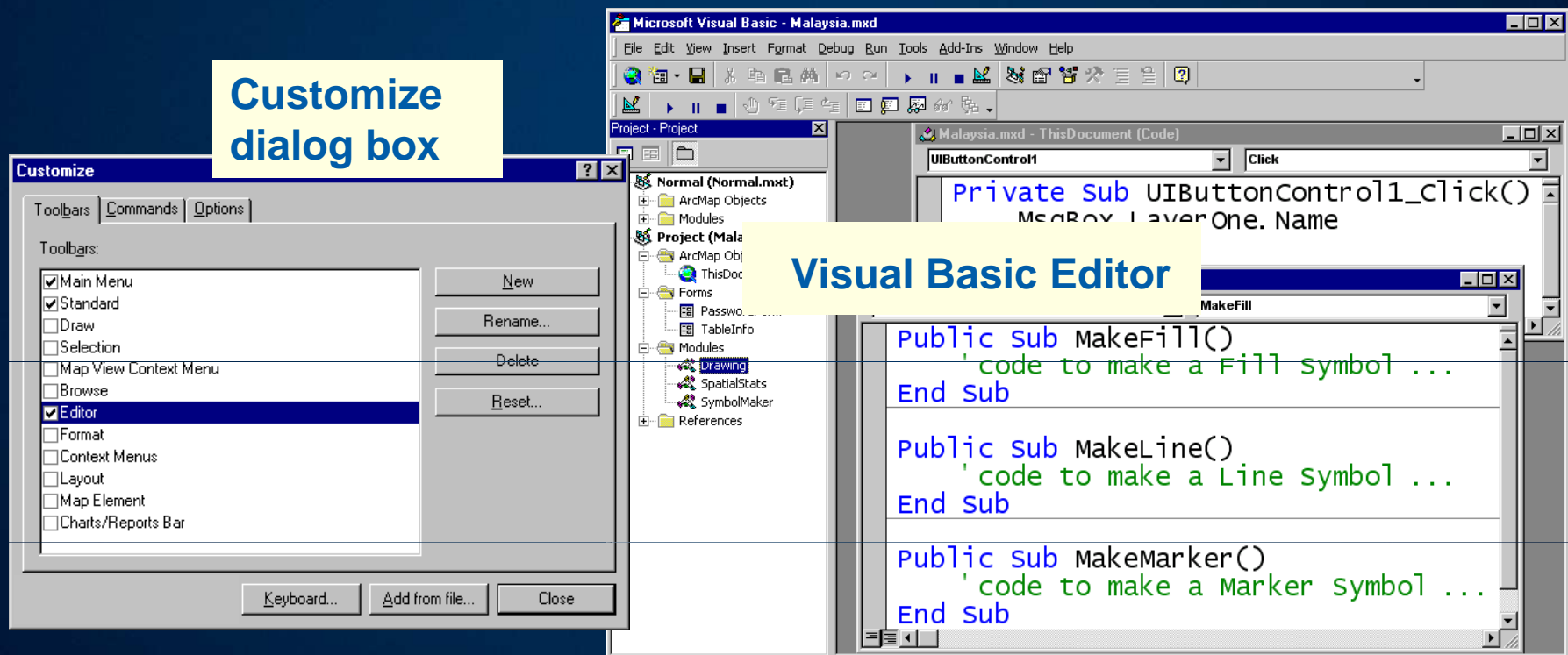


Demonstration

- Examine the customize dialog box
- Start customizing the interface
 - Add a new toolbar
 - Add new buttons
 - Change icons

VBA Development Environment

- Similar environment for **all** applications that use VBA
 - Customize dialog box: Interface customization
 - Visual Basic Editor: Write code



Visual Basic Editor

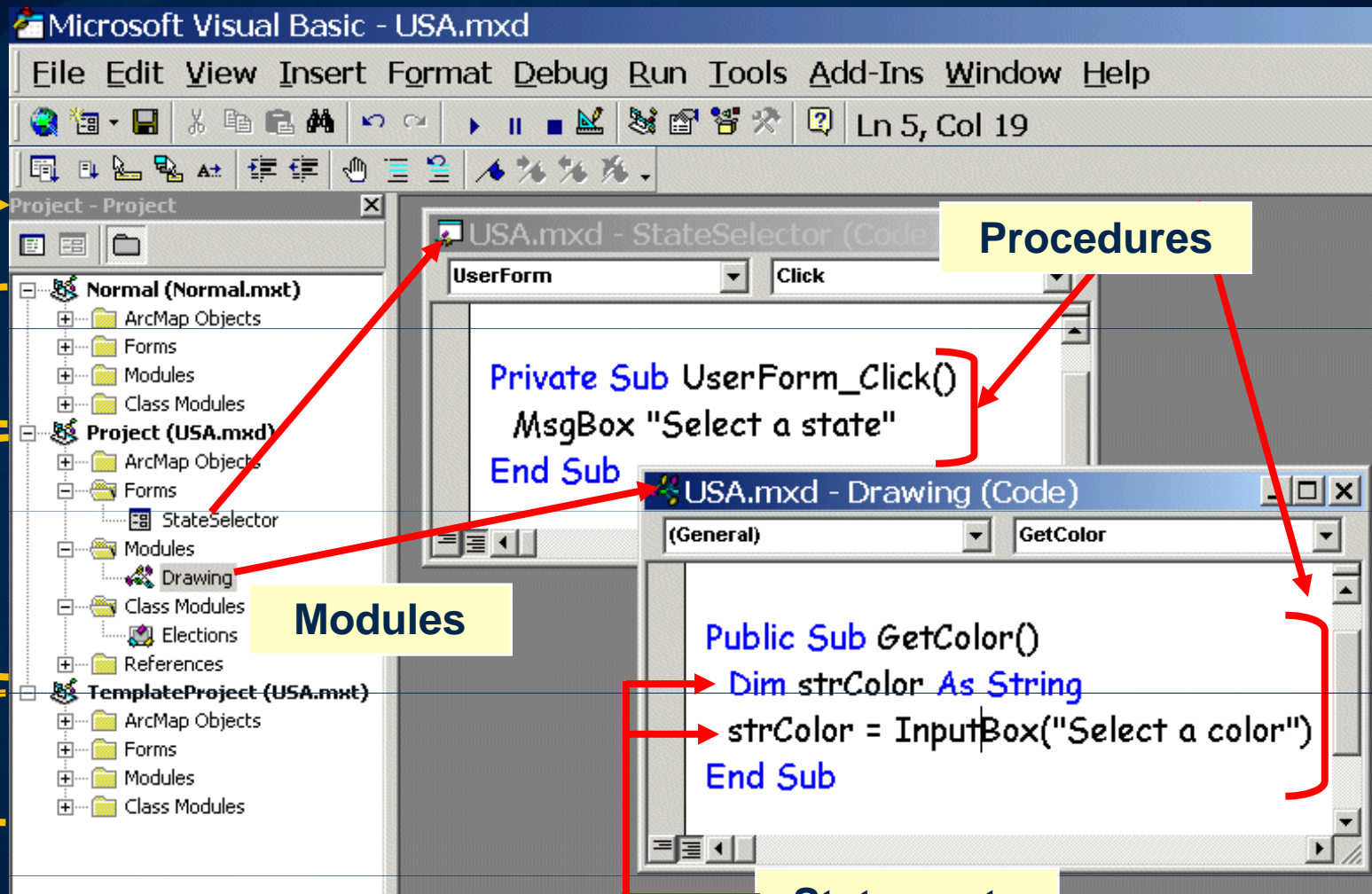
Project explorer

Projects

Modules

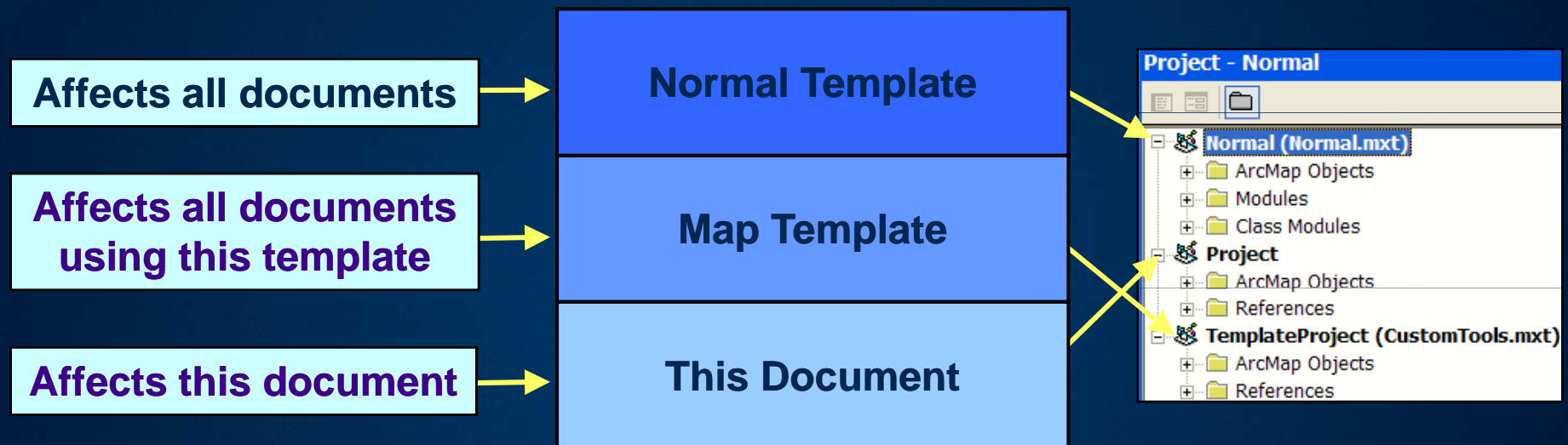
Procedures

Statements



Accessing your customizations

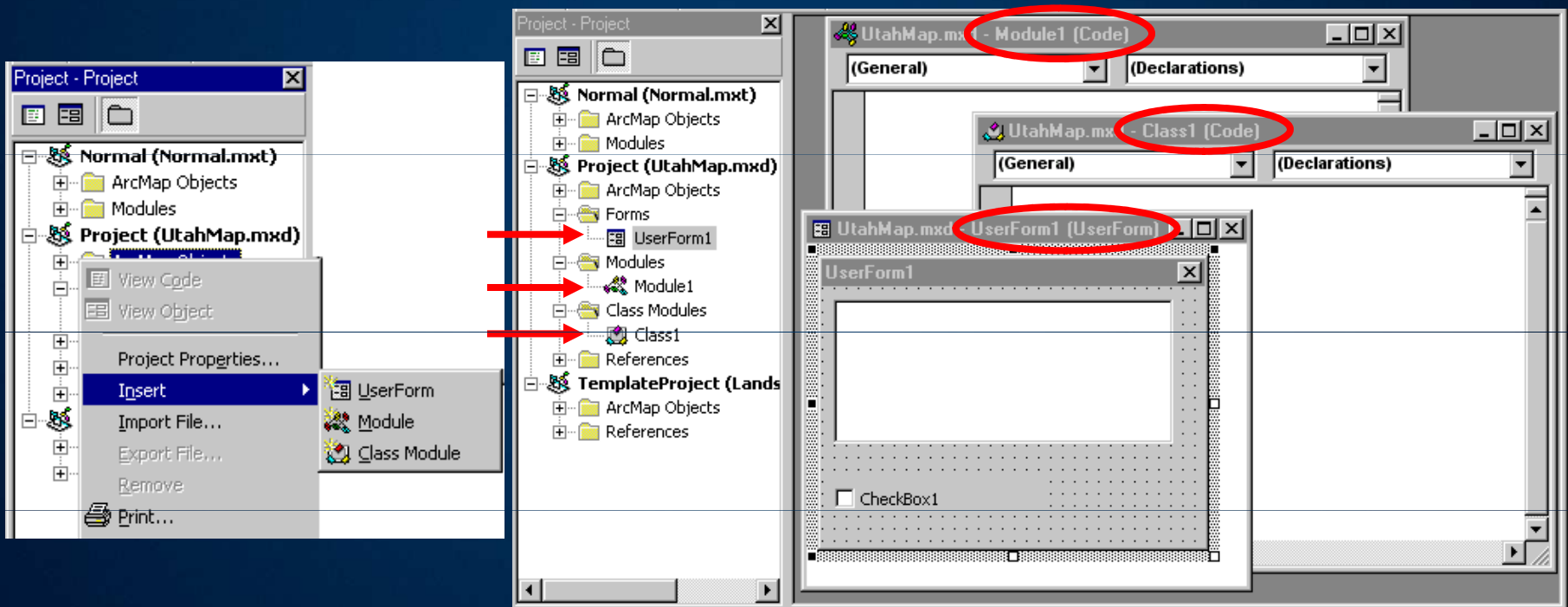
- ArcMap has three levels of storage
- Templates read in order on startup



- Changes to ThisDocument override templates
- ArcCatalog only uses Normal.gxt template

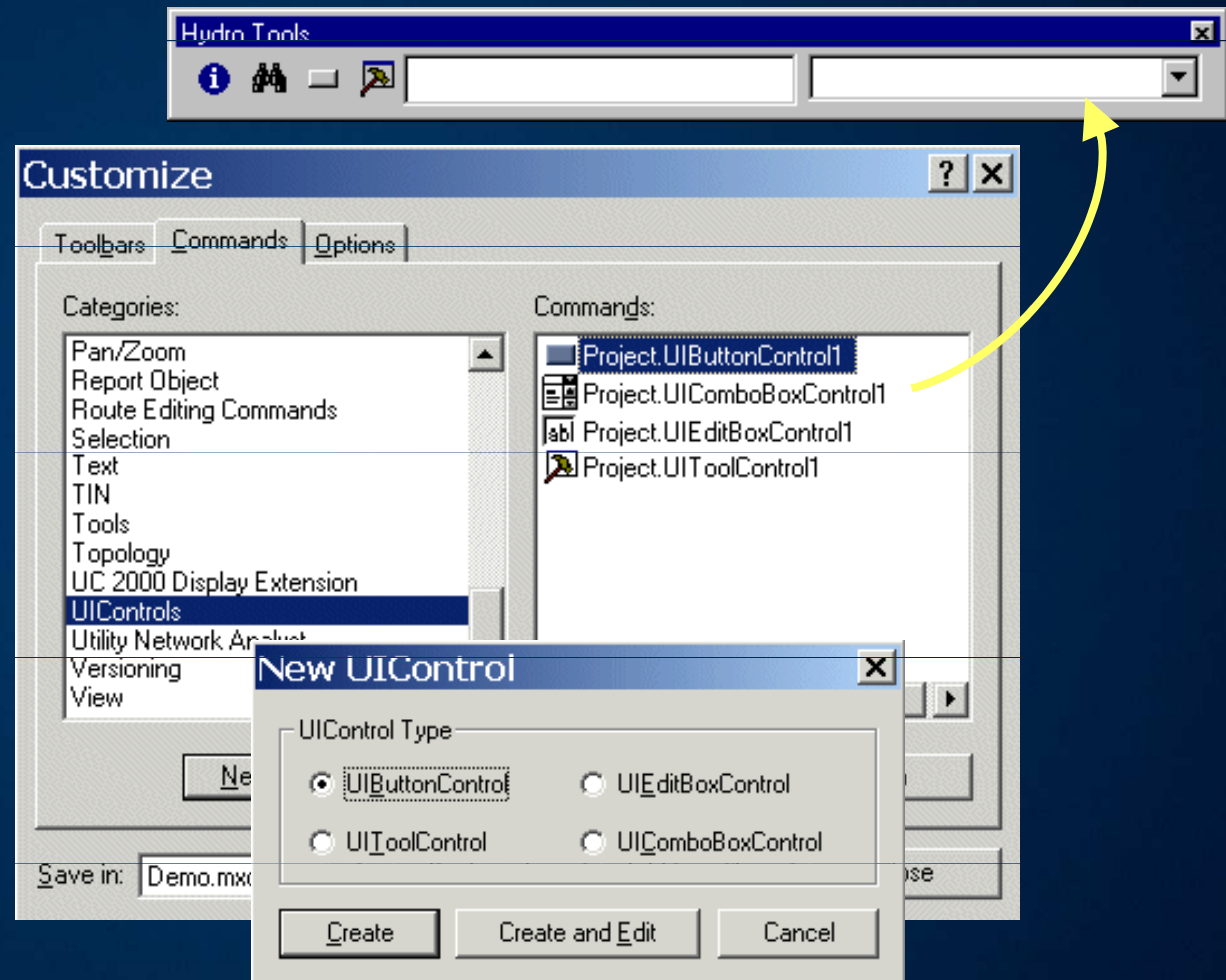
Modules

- Documents that store code
 - Module (standard module): Contains standalone code
 - Class module: Contains a class definition
 - UserForm: Contains code and layout for a form



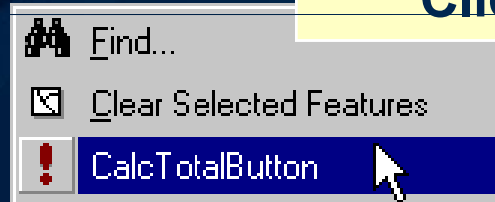
UIControls

- User created commands
- Four types
 - Button
 - Tool
 - EditBox
 - ComboBox



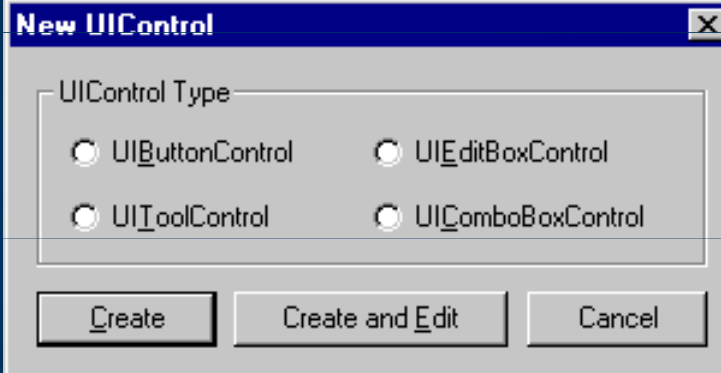
Event Procedures

Click



Change

State_Name = "Morelos"

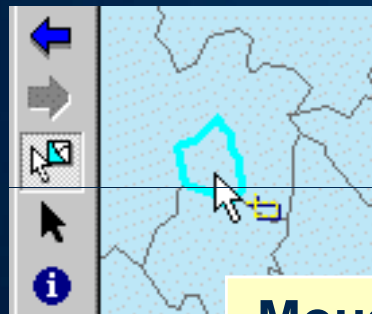


ToolTip

1:250,000

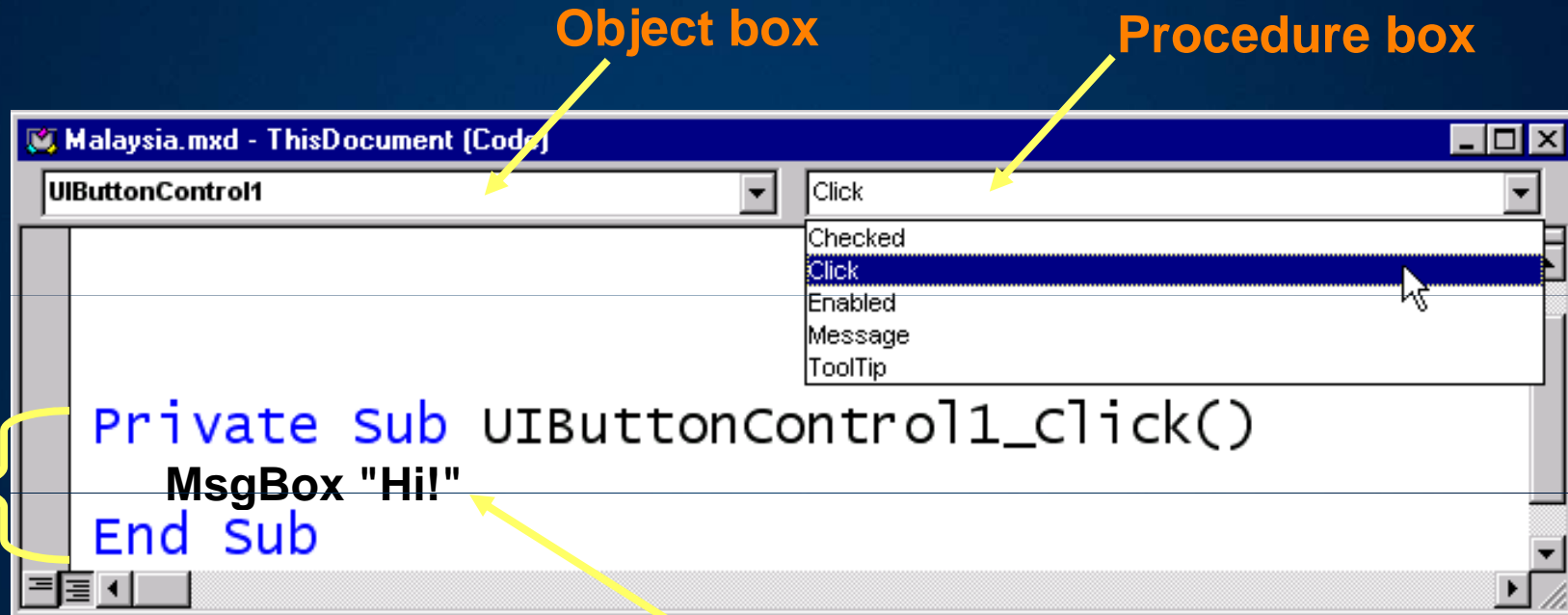
Map Scale

MouseDown



Navigating Event Procedures

- Choose a control in the *Object* box
- Choose an event in the *Procedure* box



Wrapper lines are
added automatically

Write code to run when
UIButtonControl1 is clicked

Demonstration

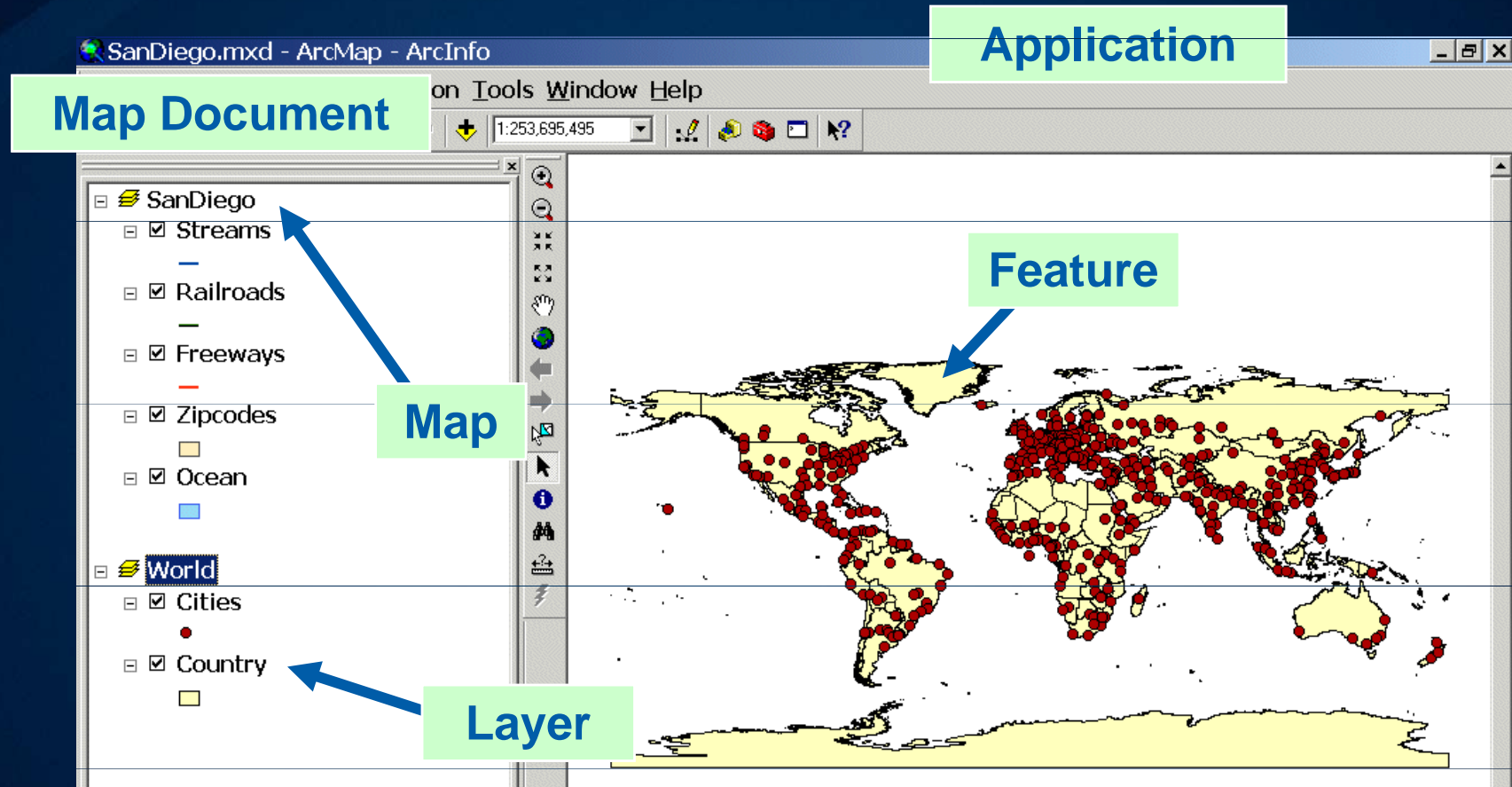
- Create a UI control with the Customize Dialog Box
- Display a simple Message Box upon click

ArcObjects

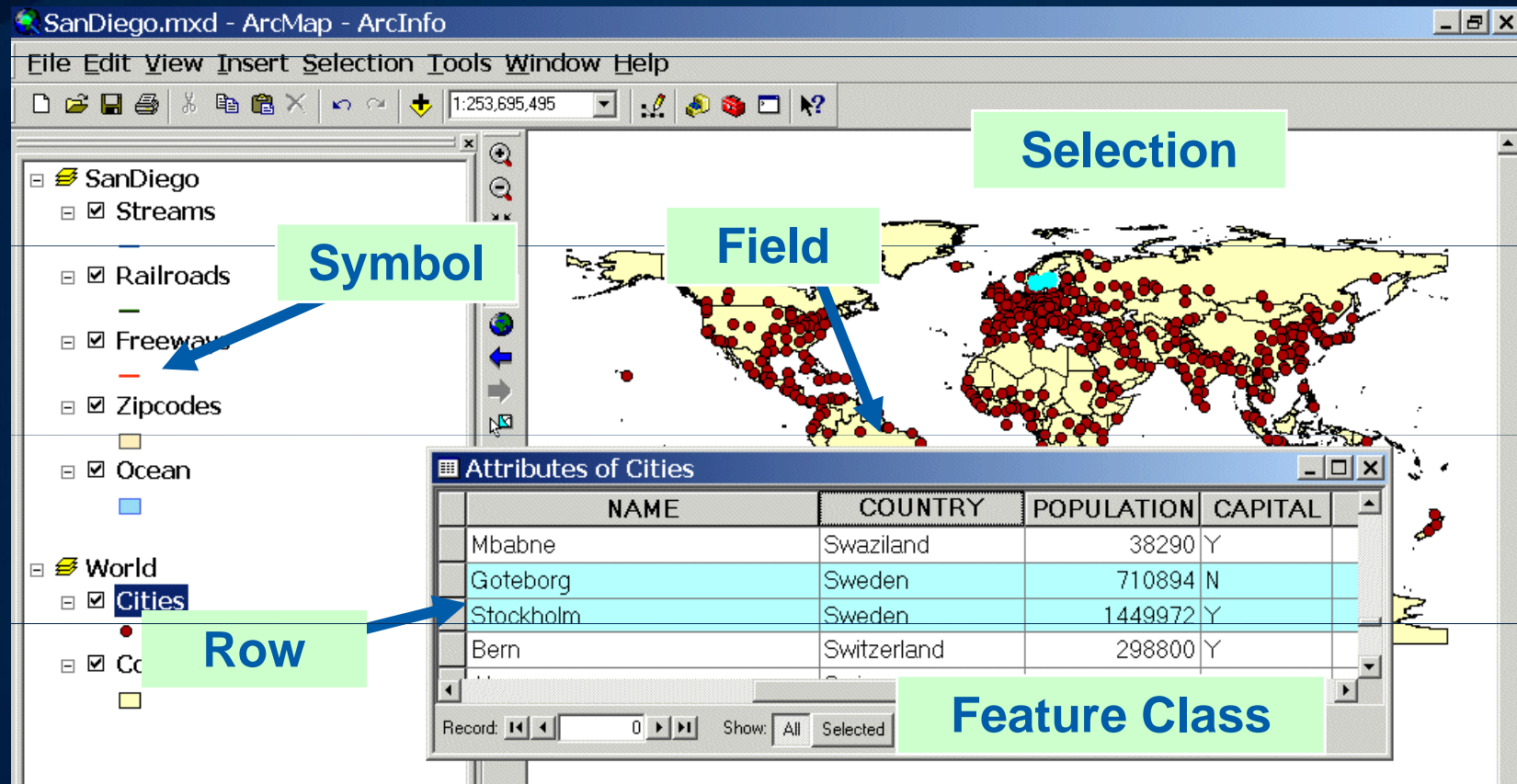
- The building blocks of ESRI software
 - ArcGIS Desktop
 - ArcGIS Engine
 - ArcGIS Server

Common ArcObjects

- ArcGIS is built with a set of ArcObjects



Common ArcObjects



Object Oriented programming

- Object members:
 - Properties (■—■)
 - Methods (←)

Map ArcObject

■—Layer: ILayer

■—LayerCount: Double

■—Name: String

■—ReferenceScale: Double

■—SelectionCount: Double

← AddLayer(ILayer)

← ClearLayers

■—Extent: IEnvelope

■—FullExtent: IEnvelope

■—GraphicsContainer: IGraphicsContainer

■—Selection: ISelection

← Clear

← Refresh

Interfaces

Interfaces

IMap

IActiveView

- Logical grouping of properties and methods

Map ArcObject

Layer: ILayer

LayerCount: Double

Name: String

ReferenceScale: Double

SelectionCount: Double

AddLayer(ILayer)

ClearLayers

Extent: IEnvelope

FullExtent: IEnvelope

GraphicsContainer: IGraphicsContainer

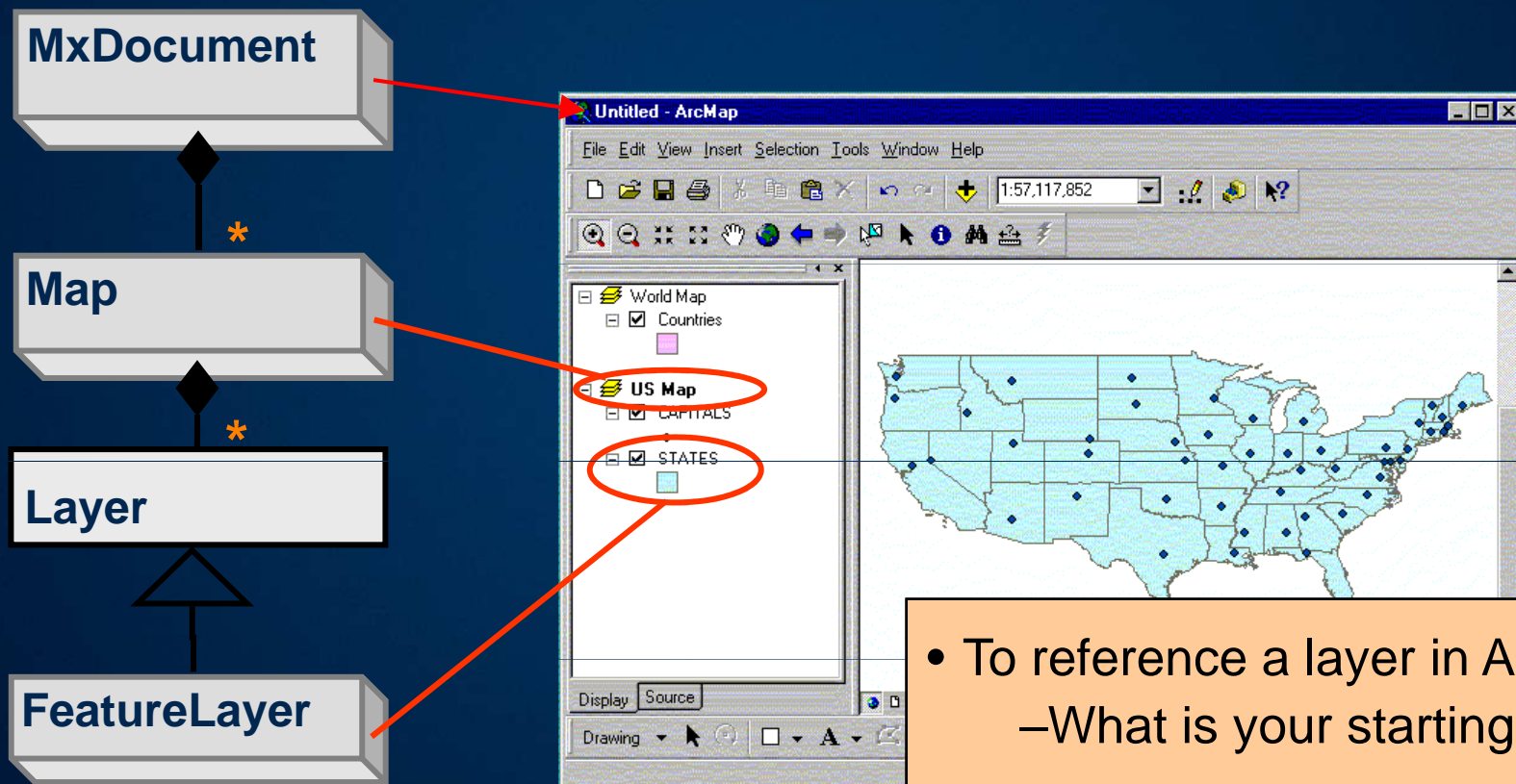
Selection: ISelection

Clear

Refresh

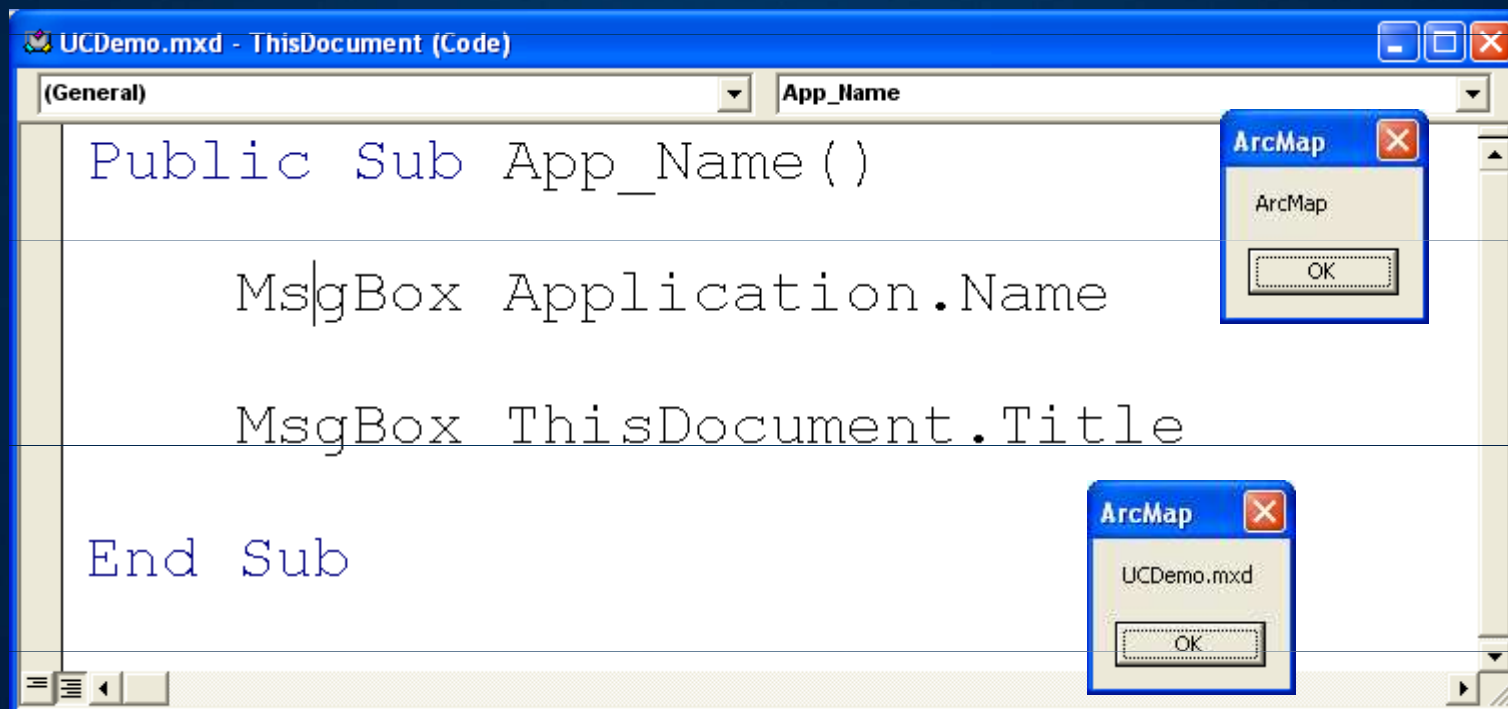
Relationship between ArcObjects

- To reference an existing ArcObjects
 - Can not reference it directly
 - Must think about where it resides in object model



Starting points for writing code

- VBA offers two preset variables
 - *Application* references the ArcMap application
 - *ThisDocument* references the MxDocument

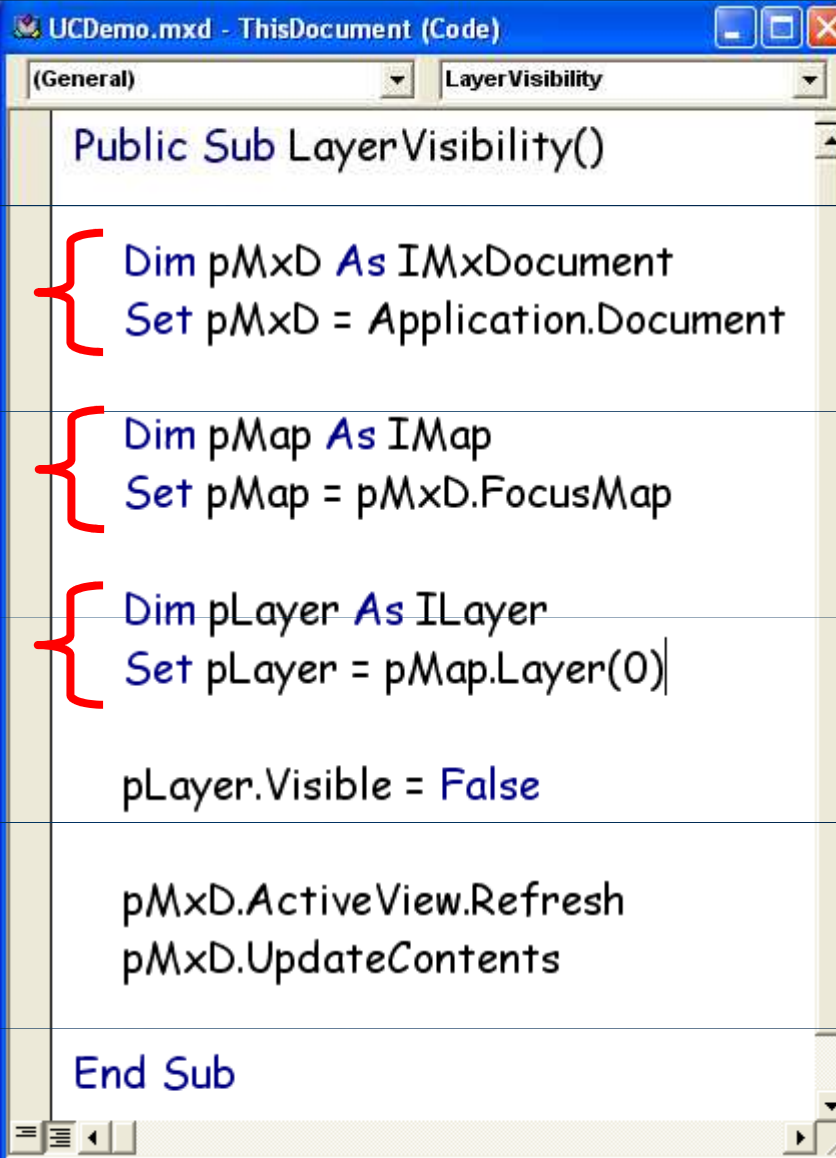


ArcObjects example

MxDocument

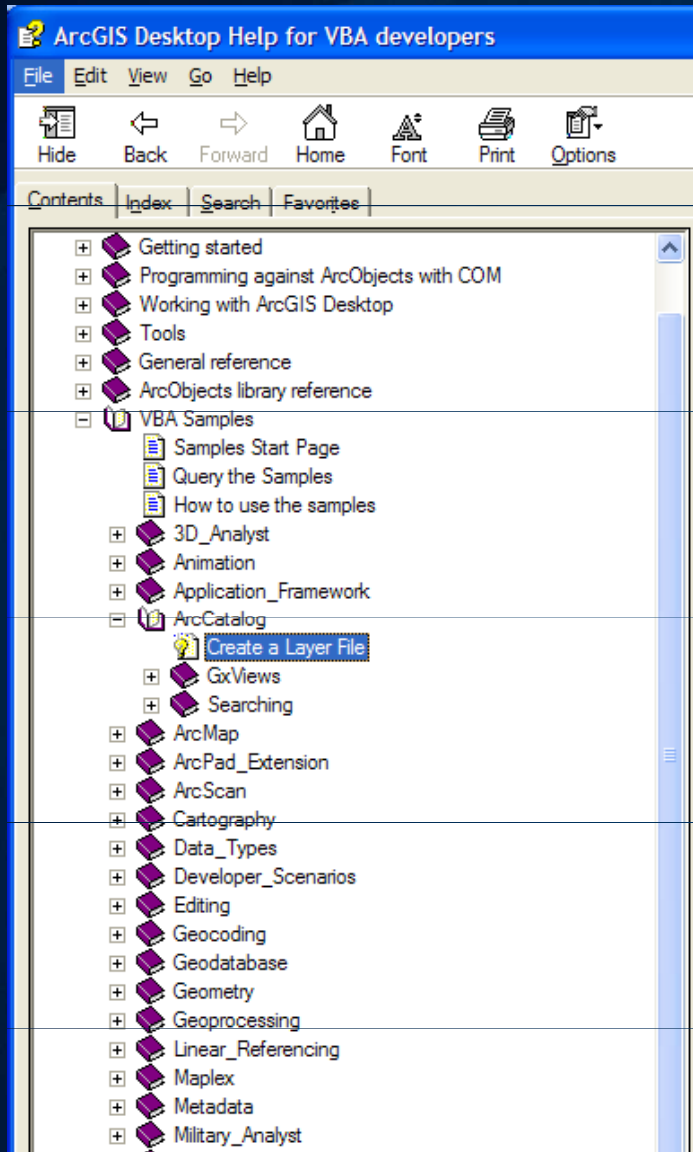
Map (Data Frame)

Layer



```
Public Sub LayerVisibility()  
    Dim pMxD As IMxDocument  
    Set pMxD = Application.Document  
  
    Dim pMap As IMap  
    Set pMap = pMxD.FocusMap  
  
    Dim pLayer As ILayer  
    Set pLayer = pMap.Layer(0)  
  
    pLayer.Visible = False  
  
    pMxD.ActiveView.Refresh  
    pMxD.UpdateContents  
  
End Sub
```


Finding Existing Code



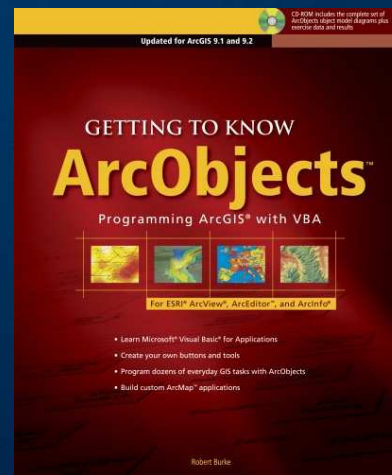
- Use VBA Help
 - Tips 
 - Source code
 - Copy and paste into VBA
- <http://edn.esri.com>
 - Code Exchange tab

Demonstration

- Examine the VBA Developer Help
- Copy a code snippet to work with ArcMap

Useful Resources

- ESRI Developer Network (EDN):
 - <http://edn.esri.com/>
 - Documentation
 - Samples
 - Discussion forums
- Instructor led training
 - <http://training.esri.com>
- Book: Getting to Know ArcObjects



Open to Questions

- Thanks for attending!